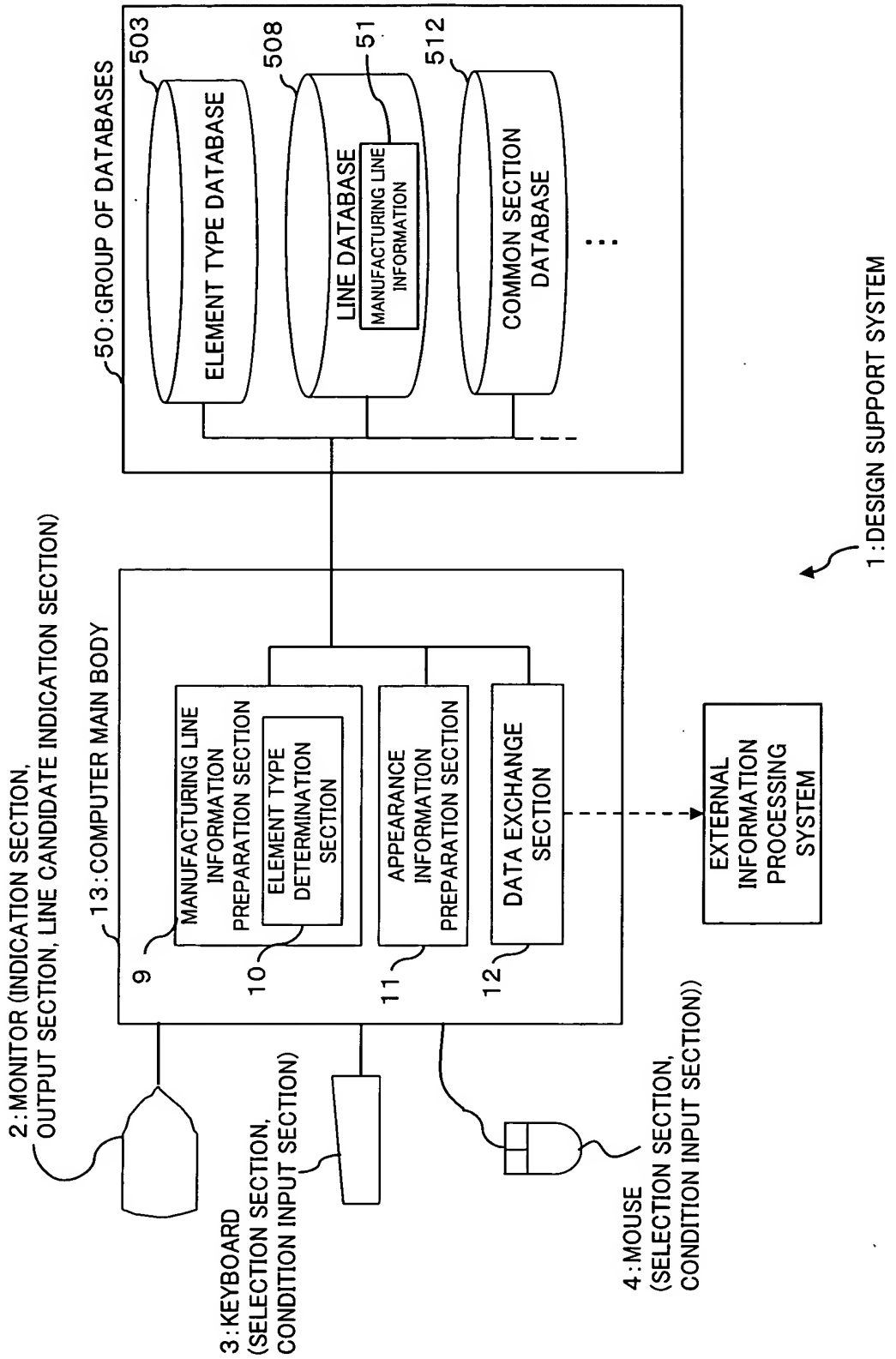
FIG. 1


1 : DESIGN SUPPORT SYSTEM
50 : GROUP OF DATABASES
503
ELEMENT TYPE DATABASE
508
LINE DATABASE
51
MANUFACTURING LINE INFORMATION
512
COMMON SECTION DATABASE
13 : COMPUTER MAIN BODY
9
MANUFACTURING LINE INFORMATION PREPARATION SECTION
10
ELEMENT TYPE DETERMINATION SECTION
11
APPEARANCE INFORMATION PREPARATION SECTION
12
DATA EXCHANGE SECTION
EXTERNAL INFORMATION PROCESSING SYSTEM
2 : MONITOR (INDICATION SECTION, OUTPUT SECTION, LINE CANDIDATE INDICATION SECTION)
3 : KEYBOARD (SELECTION SECTION, CONDITION INPUT SECTION)
4 : MOUSE (SELECTION SECTION, CONDITION INPUT SECTION))

TITLE: DESIGN SUPPORT SYSTEM
INVENTORS: Toru OKADA, et al.
SERIAL NO.:
DOCKET NO.: 1075.1255

FIG. 2

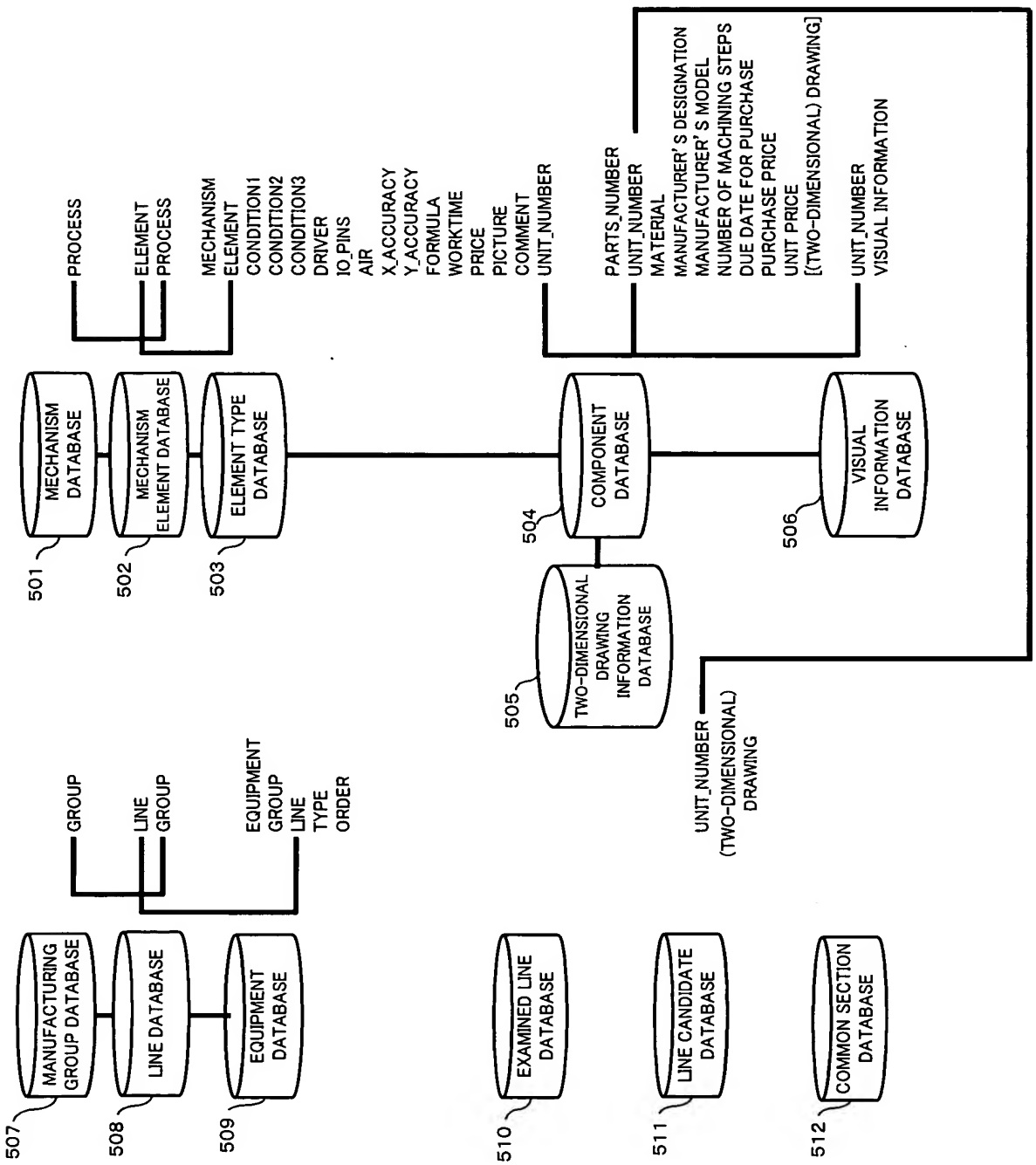


FIG. 3

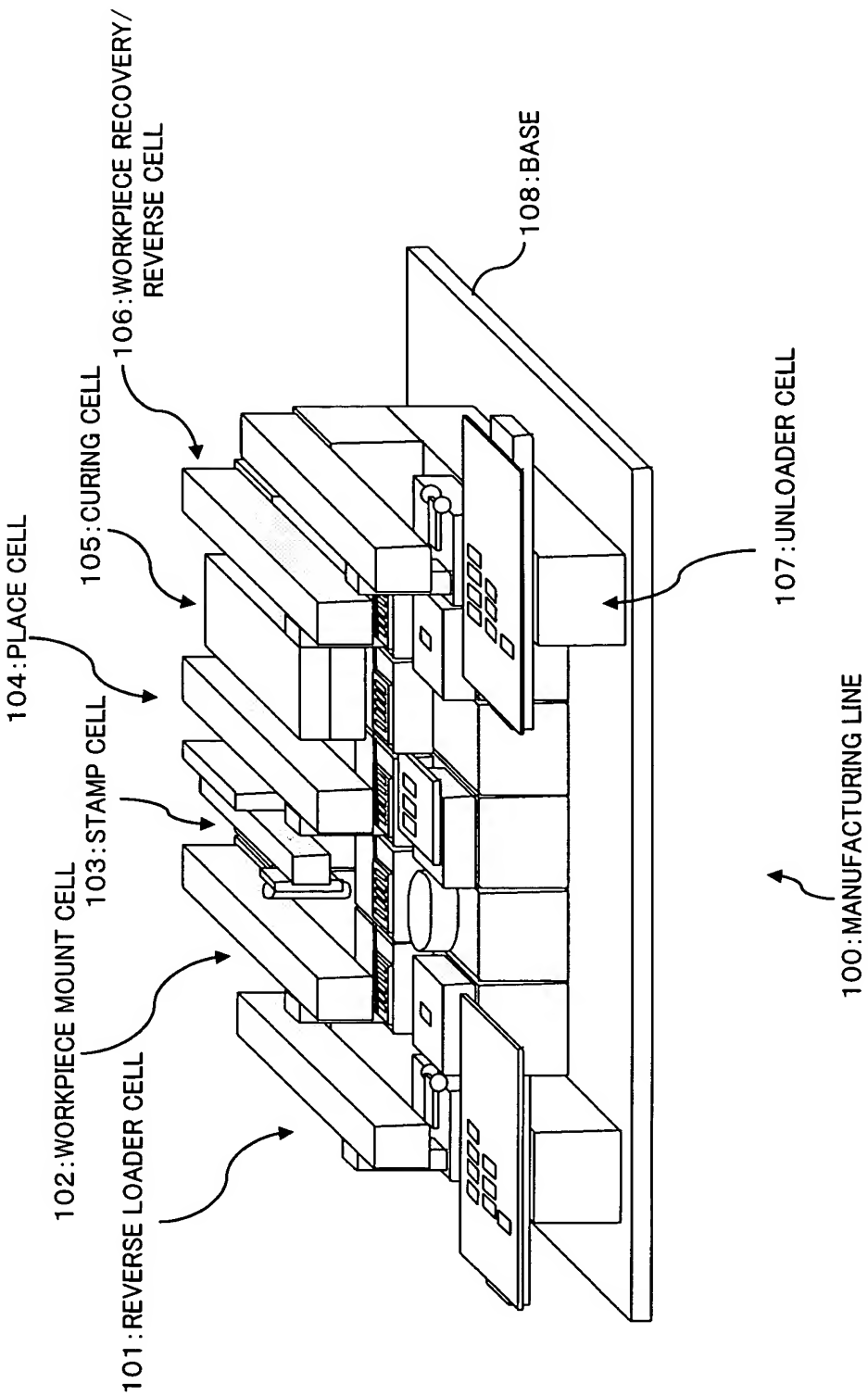

101:REVERSE LOADER CELL
102:WORKPIECE MOUNT CELL
103:STAMP CELL
104:PLACE CELL
105:CURING CELL
106:WORKPIECE RECOVERY/ REVERSE CELL
107:UNLOADER CELL
108:BASE
100:MANUFACTURING LINE

FIG. 4A

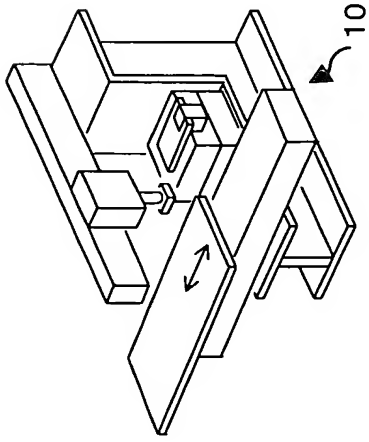


FIG. 4B

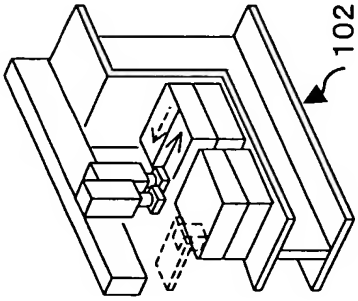


FIG. 4C

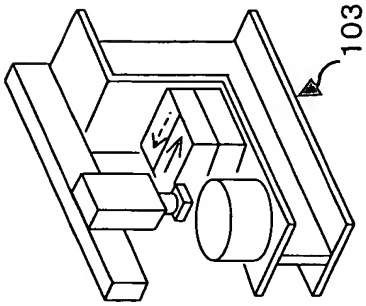


FIG. 4D

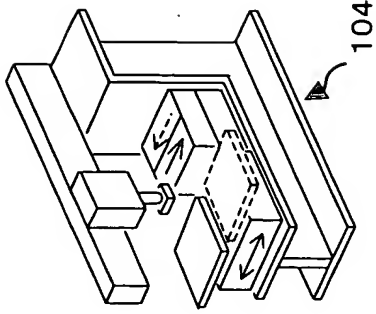


FIG. 4E

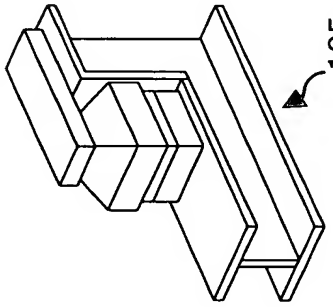


FIG. 4F

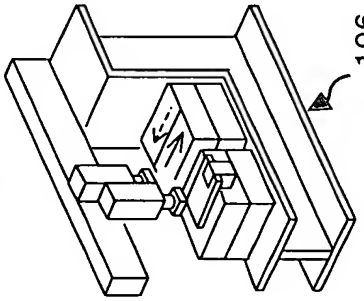


FIG. 4G

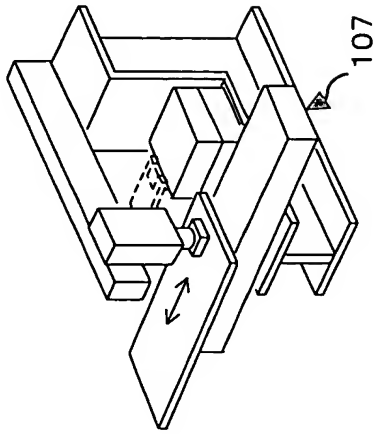
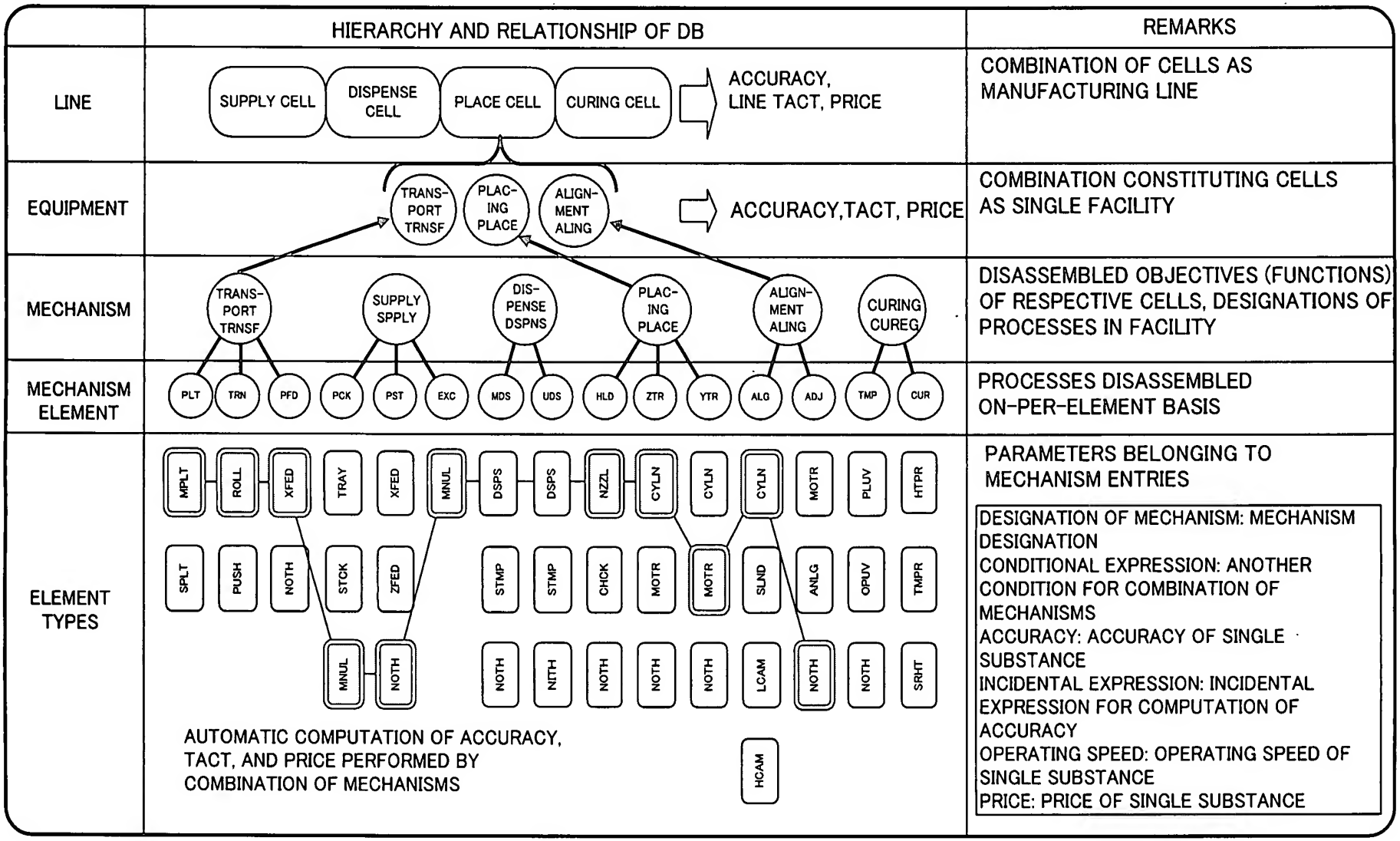


FIG. 5



TITLE: DESIGN SUPPORT SYSTEM
INVENTORS: Toru OKADA, et al.
SERIAL NO.:
DOCKET NO.: 1075.1255

FIG. 6

PROCESS	TRANSPORT			SUPPLY			DISPENSE		PLACING			ALIGNMENT		PROVISIONAL CURING	
	TRNSF			SPPLY			DSPNS		PLACE			ALIGN		CUREG	
MECHANISM ELEMENT	PALLET	TRANSPORT	PITCH FEED	PACKAGING	SUPPLY POSITION	EXCHANGE	DISPENSE OF PRINCIPAL COMPOUND	UV DISPENSE	HOLD	Z TRANSFER	Y TRANSFER	ALIGNER	FINE ADJUSTMENT HEAD	TEMPORARY TACKING	PROVISIONAL CURING
	PLT	TRN	PFD	PCK	PST	EXC	MDS	UDS	HLD	ZTR	YTR	ALG	ADJ	TMP	CUR
ELEMENT TYPE	MULTIPLE PALLET	ROLLER	X-AXIS FEEDING MECHANISM	TRAY	X-AXIS FEEDING	MANUAL	DISPENSING	DISPENSING	ABSORPTION NOZZLE	AIR CYLINDER	AIR CYLINDER	CYLINDER	MOTOR	PLACED EXPOSURE TO UV	HEATING AND PRESSURIZATION
	MPLT	ROLL	XFED	TRAY	XFED	MNUL	DSPS	DSPS	NZZL	CYLN	CYLN	CYLN	MOTR	PLUV	HTPR
CONDITIONAL EXPRESSION 1	PFD/XFED			PST/XFED								ADJ/NOTH		CUR/TMPR	
CONDITIONAL EXPRESSION 2		AUTOMATIC SELECTION												CUR/SRHT	
CONDITIONAL EXPRESSION 3				AUTOMATIC SELECTION											
ACCURACY	10		5						2	3	5	3	5	3	10
INCIDENTAL EXPRESSION															
TACT										1		1			
PRICE	¥100,000														
ELEMENT TYPE	SINGLE PALLET	PRESSURE	NOTHING	STICK	Z-AXIS FEEDING		STAMP	STAMP	CHUCK	MOTOR	MOTOR	SOLENOID	ANALOG	OPEN UV EXPOSURE	TEMPORARY HEATING/PRESSURIZATION
	SPLT	PUSH	NOTH	STCK	ZFED		STMP	STMP	CHCK	MOTR	MOTR	SLND	ANLG	OPUV	TMPR
CONDITIONAL EXPRESSION 1	PFD/NOTH			PST/ZFED								ADJ/NOTH		CUR/TMPR	
CONDITIONAL EXPRESSION 2														CUR/SRHT	
CONDITIONAL EXPRESSION 3															
ACCURACY	5		3						3	3	5	3	2	5	5
INCIDENTAL EXPRESSION															
TACT										0.5		0.2			
PRICE															
ELEMENT TYPE				MANUAL	NOTHING		NOTHING	NOTHING	NOTHING	NOTHING	NOTHING	CAMERA 1	NOTHING	NOTHING	SURROUND HEATING
				MNUL	NOTH		NOTH	NOTH	NOTH	NOTH	NOTH	LCAM	NOTH	NOTH	SRHT
CONDITIONAL EXPRESSION 1				PST/NOTH								ADJ/MOTR		CUR/HTPR	
CONDITIONAL EXPRESSION 2												ADJ/ANLG		CUR/SRHT	
CONDITIONAL EXPRESSION 3															
ACCURACY												6			3
INCIDENTAL EXPRESSION												-PLACE			
TACT															
PRICE															
ELEMENT TYPE												CAMERA 2			
												HCAM			
CONDITIONAL EXPRESSION 1												ADJ/MOTR			
CONDITIONAL EXPRESSION 2												ADJ/ANLG			
CONDITIONAL EXPRESSION 3															
ACCURACY												3			
INCIDENTAL EXPRESSION												-PLACE			
TACT															
PRICE															

REGISTER FORMULA WITHIN ELEMENT TYPE DB

EXPRESSIONS FOR CANCELLING COMPUTATION OF ACCURACY OF PLACE SECTION THROUGH ALIGNMENT OF CAMERA

TITLE: DESIGN SUPPORT SYSTEM
INVENTORS: Toru OKADA, et al.
SERIAL NO.:
DOCKET NO.: 1075.1255

FIG. 7A

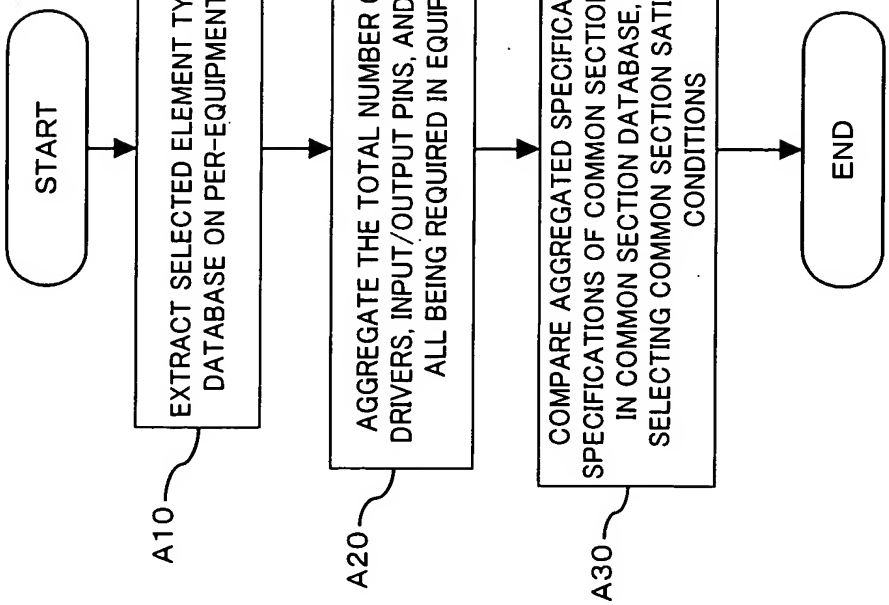


FIG. 7B

[TOTAL REQUIRED NUMBER]

DRIVERS	INPUT/OUTPUT PINS	AIR PIPES
12	40	6

[ACCURACY CAPABILITY OF COMMON SECTION]

	DRIVERS	INPUT/OUTPUT PINS	AIR PIPES
TYPE A	10	34	8
TYPE B	16	50	12
TYPE C	20	60	8

TYPE B IS DETERMINED TO BE APPROPRIATE

FIG. 8

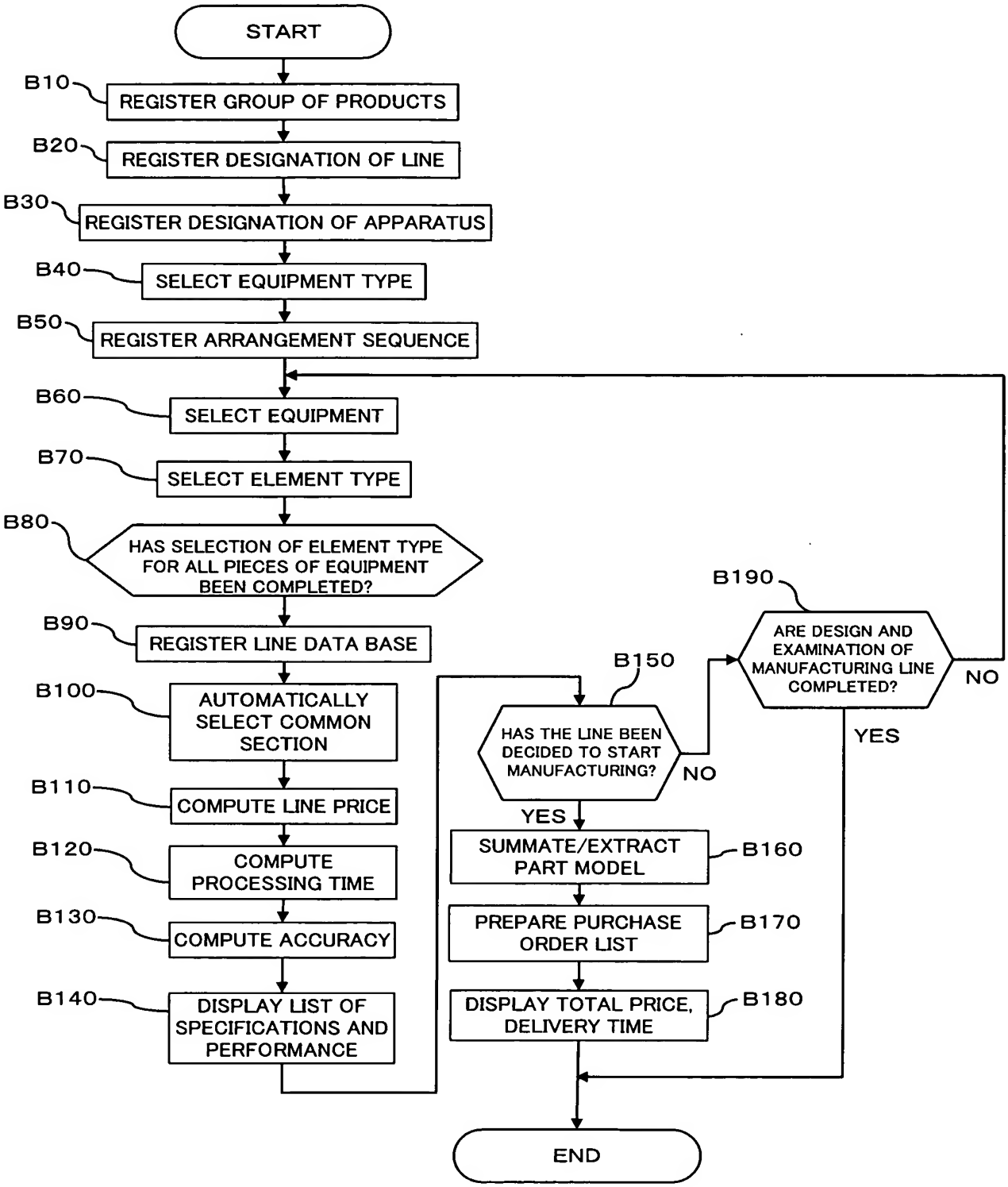

START
B10
REGISTER GROUP OF PRODUCTS
B20
REGISTER DESIGNATION OF LINE
B30
REGISTER DESIGNATION OF APPARATUS
B40
SELECT EQUIPMENT TYPE
B50
REGISTER ARRANGEMENT SEQUENCE
B60
SELECT EQUIPMENT
B70
SELECT ELEMENT TYPE
B80
HAS SELECTION OF ELEMENT TYPE FOR ALL PIECES OF EQUIPMENT BEEN COMPLETED?
B90
REGISTER LINE DATA BASE
B100
AUTOMATICALLY SELECT COMMON SECTION
B110
COMPUTE LINE PRICE
B120
COMPUTE PROCESSING TIME
B130
COMPUTE ACCURACY
B140
DISPLAY LIST OF SPECIFICATIONS AND PERFORMANCE
B150
HAS THE LINE BEEN DECIDED TO START MANUFACTURING?
NO
YES
B160
SUMMATE/EXTRACT PART MODEL
B170
PREPARE PURCHASE ORDER LIST
B180
DISPLAY TOTAL PRICE, DELIVERY TIME
B190
ARE DESIGN AND EXAMINATION OF MANUFACTURING LINE COMPLETED?
NO
YES
END

FIG. 9

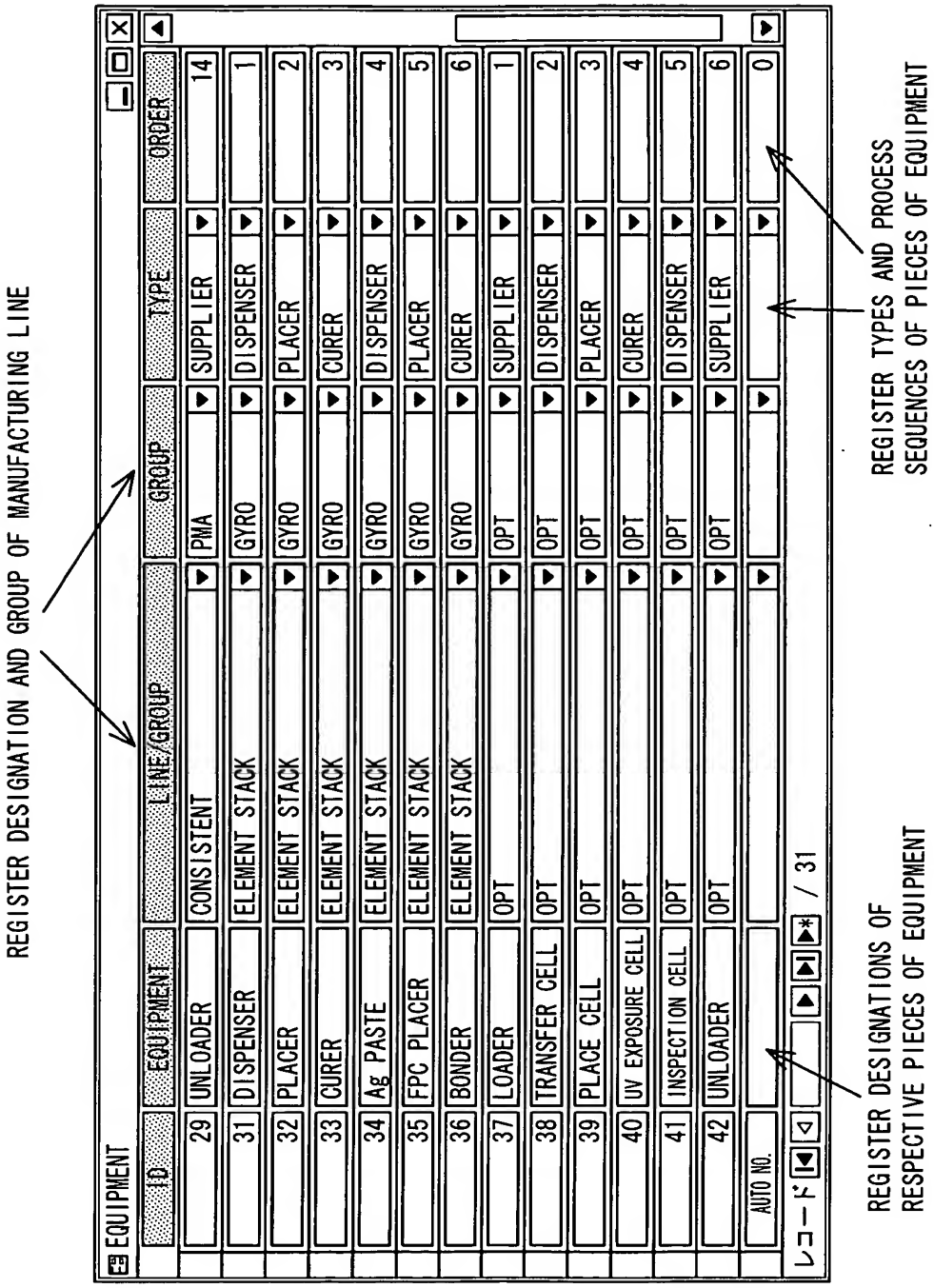

REGISTER DESIGNATION AND GROUP OF MANUFACTURING LINE
REGISTER TYPES AND PROCESS SEQUENCES OF PIECES OF EQUIPMENT
REGISTER DESIGNATIONS OF RESPECTIVE PIECES OF EQUIPMENT
EQUIPMENT
ID
EQUIPMENT
LINE/GROUP
GROUP
TYPE
ORDER
29 UNLOADER CONSISTENT PMA SUPPLIER 14
31 DISPENSER ELEMENT STACK GYRO DISPENSER 1
32 PLACER ELEMENT STACK GYRO PLACER 2
33 CURER ELEMENT STACK GYRO CURER 3
34 Ag PASTE ELEMENT STACK GYRO DISPENSER 4
35 FPC PLACER ELEMENT STACK GYRO PLACER 5
36 BONDER ELEMENT STACK GYRO CURER 6
37 LOADER OPT OPT SUPPLIER 1
38 TRANSFER CELL OPT OPT DISPENSER 2
39 PLACE CELL OPT OPT PLACER 3
40 UV EXPOSURE CELL OPT OPT CURER 4
41 INSPECTION CELL OPT OPT DISPENSER 5
42 UNLOADER OPT OPT SUPPLIER 6
AUTO NO. 0
レコード
/ 31

FIG. 10

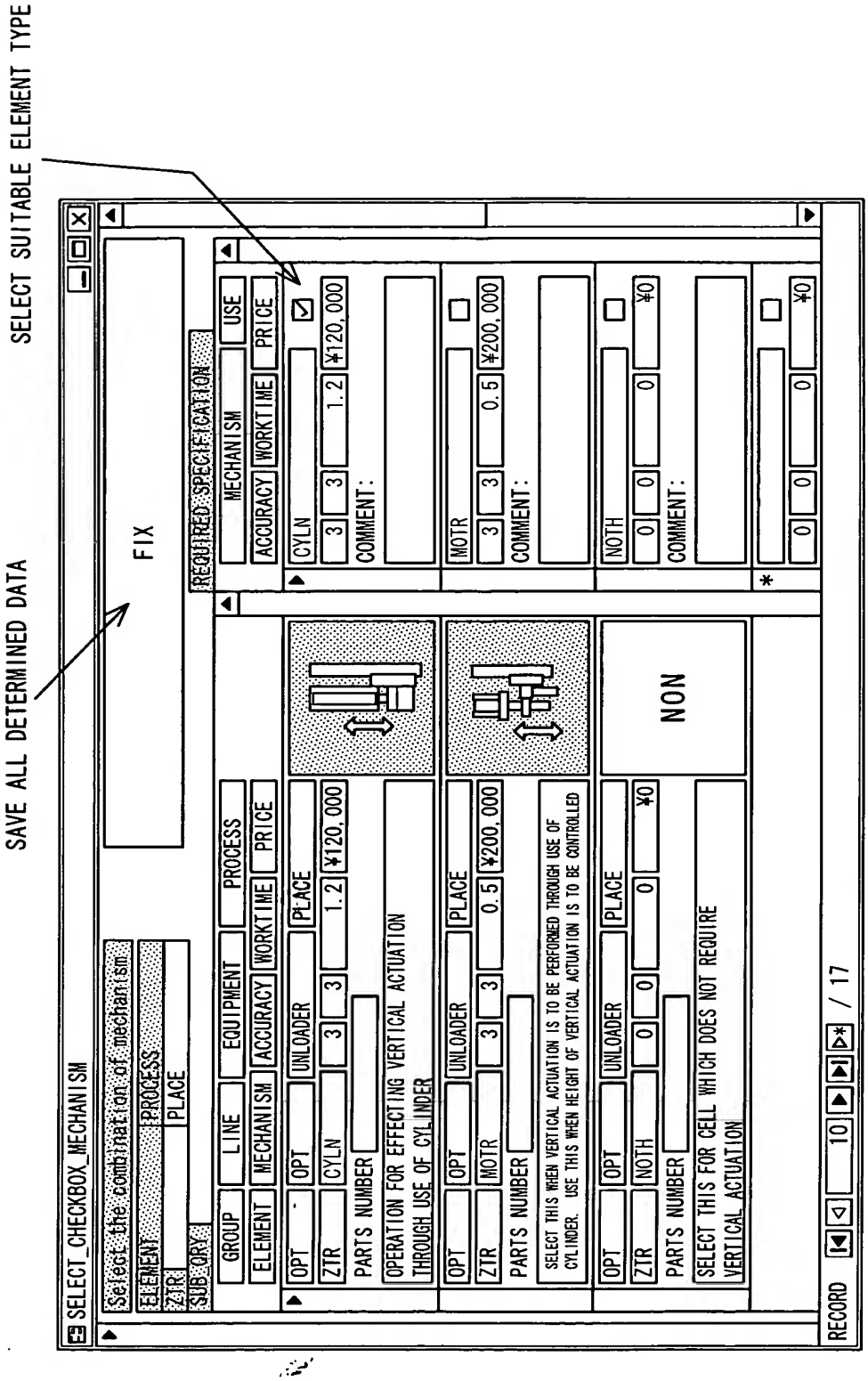
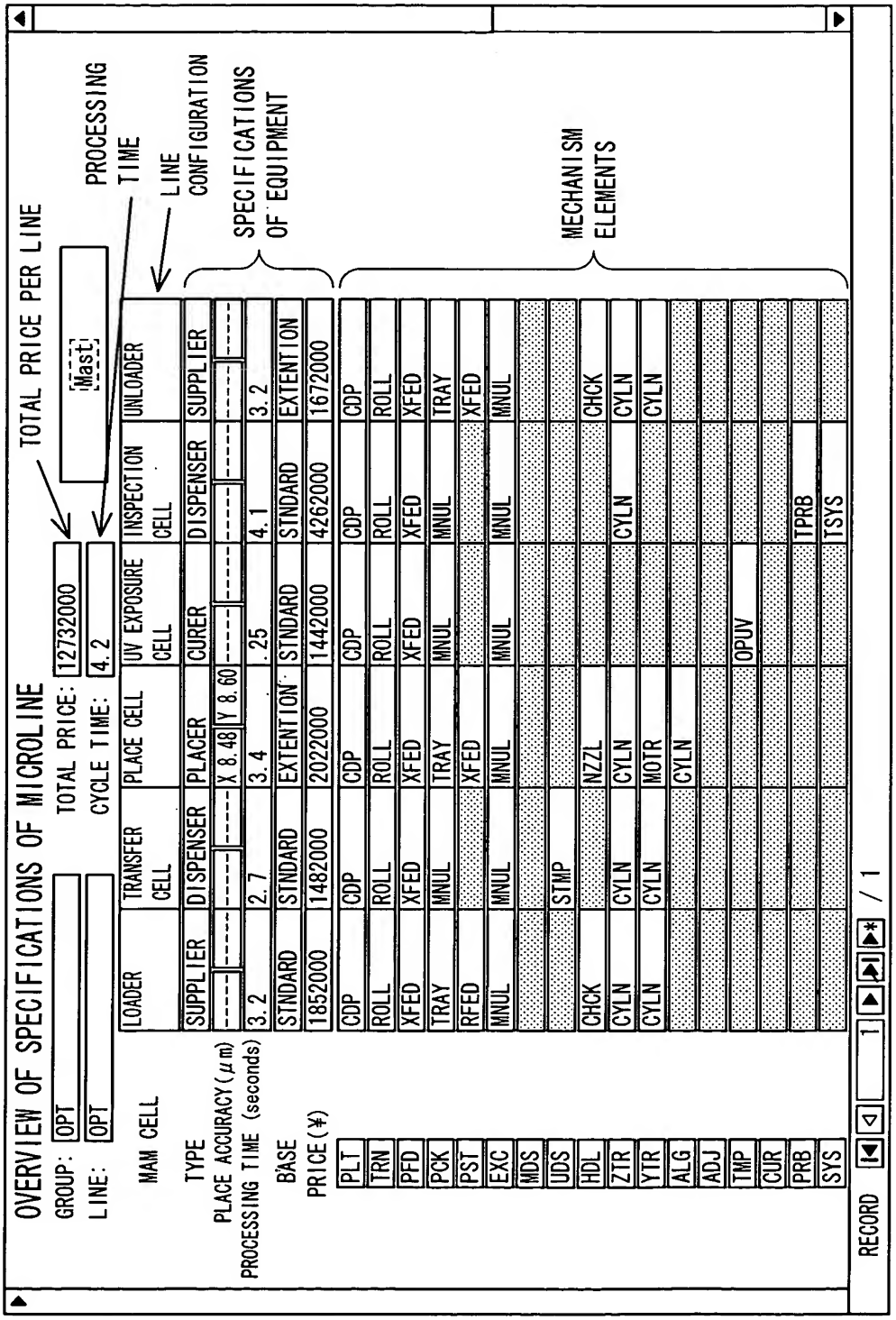

SAVE ALL DETERMINED DATA
SELECT SUITABLE ELEMENT TYPE
SELECT_CHECKBOX_MECHANISM
Select the combination of mechanism
ELEMENT
PROCESS
ZTR
PLACE
SUBSTORY
FIX
GROUP
LINE
EQUIPMENT
PROCESS
ELEMENT
MECHANISM
ACCURACY
WORKTIME
PRICE
REQUIRED SPECIFICATION
MECHANISM
ACCURACY
WORKTIME
PRICE
USE
OPT
UNLOADER
PLACE
ZTR
CYLN
3
3
1.2
¥120,000
PARTS NUMBER
OPERATION FOR EFFECTING VERTICAL ACTUATION THROUGH USE OF CYLINDER
COMMENT:
OPT
UNLOADER
PLACE
ZTR
MOTR
3
3
0.5
¥200,000
PARTS NUMBER
SELECT THIS WHEN VERTICAL ACTUATION IS TO BE PERFORMED THROUGH USE OF CYLINDER. USE THIS WHEN HEIGHT OF VERTICAL ACTUATION IS TO BE CONTROLLED
COMMENT:
NON
OPT
UNLOADER
PLACE
ZTR
NOTH
0
0
0
¥0
PARTS NUMBER
SELECT THIS FOR CELL WHICH DOES NOT REQUIRE VERTICAL ACTUATION
COMMENT:
RECORD
10
/ 17

FIG. 11


OVERVIEW OF SPECIFICATIONS OF MICROLINE
GROUP: OPT
LINE: OPT
TOTAL PRICE: 12732000
CYCLE TIME: 4.2
[Mast]
TOTAL PRICE PER LINE
PROCESSING TIME
LINE CONFIGURATION
SPECIFICATIONS OF EQUIPMENT
MECHANISM ELEMENTS
MAM CELL
LOADER
TRANSFER CELL
PLACE CELL
UV EXPOSURE CELL
INSPECTION CELL
UNLOADER
TYPE
SUPPLIER
DISPENSER
PLACER
CURER
DISPENSER
SUPPLIER
PLACE ACCURACY (μm)
3.2
2.7
3.4
.25
4.1
3.2
PROCESSING TIME (seconds)
STNDARD
STNDARD
EXTENTION
STNDARD
STNDARD
EXTENTION
BASE PRICE (¥)
1852000
1482000
2022000
1442000
4262000
1672000
PLT
TRN
PFD
PCK
PST
EXC
MDS
UDS
HDL
ZTR
YTR
ALG
ADJ
TMP
CUR
PRB
SYS
CDP
ROLL
XFED
TRAY
RFED
MNUL
STMP
CHCK
CYLN
CYLN
CYLN
CDP
ROLL
XFED
MNUL
XFED
MNUL
NZZL
CYLN
MOTR
CYLN
OPUV
TPRB
TSYS
CDP
ROLL
XFED
TRAY
XFED
MNUL
CHCK
CYLN
CYLN
CYLN
RECORD
1
/ 1